ON THE

EVIDENCE AFFORDED BY FOSSIL PLANTS,

AS TO

THE BOUNDARY LINE

BETWEEN THE

DEVONIAN AND CARBONIFEROUS ROCKS.

BY

THE REV. SAMUEL HAUGHTON, M.A.,

PROFESSOR OF GEOLOGY IN THE UNIVERSITY OF DUBLIN.

From the Journal of the Geological Society of Dublin, January 10, 1855.

DUBLIN:

PRINTED BY M. H. GILL,

PRINTER TO THE GEOLOGICAL SOCIETY.

1855.

ON THE EVIDENCE,

&c. &c.

The drawing of a boundary line between different geological periods is a problem which becomes more difficult in proportion as our knowledge increases. The divisions made by nature in geology are seldom abrupt, and it is, therefore, often difficult to systematize our knowledge, and compel the various groups of rocks we meet with to range themselves in rank and file under the heads of our book-made systems.

We are assisted mainly in our efforts to draw these boundary lines by two principles:—

1st. When two groups of rocks are unconformable, provided this unconformability is not merely local, we are entitled to draw the boundary line between them.

2nd. When one or other of two groups of conformable rocks do not contain fossils, we draw the line of separation at the point where the fossil remains commence or disappear.

Both of these methods of making geological distinctions are liable to exceptions, which are well known to every practical geologist; but in general it is safe to adhere to these broad principles until it is shown that the case considered is a real exception to the rule.

In attempting to draw a line between the Lower Carboniferous and Upper Devonian rocks in Ireland, Dr. Griffith, and most Irish geologists, have adhered to the second principle above laid down, and, in the absence of truly characteristic Devonian fossils, have drawn the boundary line at the base of the fossils which extend some distance below the true Carboniferous limestone, into the divisions known as the Carboniferous Slate and Yellow Sandstone of Dr. Griffith.

Until it is shown that this palæontological division is erroneous, by proving that it includes typical Devonian fossils in the Carboniferous system, we cannot accept in its place a merely lithological division, which would leave, both above and below the boundary line, typical fossils belonging to the same geological period. These

principles I regard as so obvious, and so generally received, that I shall not waste the time of the Society by further enforcing them, but shall proceed to my task of examining the fossil plants of the lower fossiliferous beds, in order to ascertain whether it is possible to draw a line separating them into Devonian and Carboniferous; and if the result of that examination should be, that no such line can be drawn, then we are entitled, in accordance with the second principle laid down, to draw the boundary line at the base of the fossiliferous beds.

Some geologists of reputation are of opinion, that the first introduction of land plants on the earth took place at the close of the Devonian and commencement of the Carboniferous period; and explain the occurrence of anthracitic and bituminous beds in the Silurian rocks of Ireland, Scotland, and Russia, by the hypothesis, that they are the result of accumulations of marine plants.

As this question was one of some interest, I undertook lately the chemical examination of the ash of the anthracite, described by Dr. Whitty as occurring, in the county of Cavan, in Silurian slates.

For the purpose of comparison, I have placed beside my results the results of two specimens of ash of Newcastle coal, examined by H. Taylor, Esq.:—

	GOOD NEWCASTLE COAL. Ash = 1·36 per cent.	IMPURE NEWCASTLE COAL. Ash = 16·90 per cent.
Silica,	59·56	64·21
Alumina,	12·19	28·78
Peroxide of Iron,	15·96	2·27
Lime,	9·99	1·34
Magnesia,	1·13	1·12
Potash,	1·17	2·28
Soda,	—	—
	100·00	100·00

SILURIAN ANTHRACITE, COUNTY OF CAVAN.
Ash = 4·28 per cent.

Silica,	71·43
Alumina and Peroxide of Iron,	19·81
Lime,	0·43
Magnesia,	1·34
Sulphate of Potash,	0·28
Sulphate of Soda,	0·23
Sulphates of Lime and Magnesia,	1·22
Alkalies in combination with Silex; Carbon; and Loss,	5·26
	100·00

It is not possible from the preceding results to draw any inference as to the origin of the Silurian anthracite; the ash appears to have a chemical composition similar to that of the slates in which it occurs, as has been observed by Mr. Taylor with respect to the ash of several varieties of coal examined by him; and as the further examination of the amount of alkalies, contained in the last item of the analysis, did not promise any result of geological value, I did not think it worth while to examine the total quantity of alkalies in the ash, as the undetermined alkalies were in combination with silica, and most probably derived from the slate in which the coal was embedded. I may add, that it was exceedingly difficult to burn this anthracite, and that a superficial examination of it would almost lead an observer to confound it with some varieties of plumbago, for which it has, I believe, been mistaken by some. This incombustibility would seriously diminish its value as a fuel, in an economic point of view, as it would require to be mixed with large quantities of more inflammable and porous fuel, in order to admit of being used to advantage.

Returning from this digression to the immediate object of my present communication to the Society, I would observe, that whether the opinion just alluded to, as to the time of the first appearance of landplants, be adopted or not, it is certain that at the close of the Devonian and commencement of the Carboniferous periods, there was a considerable development of vegetable life, which is the more remarkable from the absence of fossil land plants in the older rocks. This development of vegetable life has been observed in almost every country where the boundary of the Devonian and Carboniferous rocks has been studied with any degree of care; among others, I may mention Saxony, the Rhenish provinces, the Bas Boulonnais, Devonshire, Scotland, and Ireland (*passim*).

I shall take a few of these districts in order, and shall examine what assistance their fossil plants afford us in drawing a line between Devonian and Carboniferous rocks:—

1. In Thuringia and Saxony the labours of the German geologists, Richter and Unger, have resulted in the discovery of two distinct Floras, one, Upper Devonian, and the other, Lower Carboniferous. The Devonian Flora of Thuringia, which occurs with the characteristic *Cypridina schiefer* of German geologists, is described by Professor Unger as consisting of Ferns of new and undescribed genera, and

even of new families, together with plants intermediate between Ferns and Equisetaceæ, and primitive forms of Cycads and Conifers, of which he says no one has yet had an idea. On the other hand, the Carboniferous Flora contains a totally distinct group of forms, which are highly characteristic of the lower Carboniferous beds. Among these are mentioned:—

Calamites transitionis.—*Göpp.*
Calamites cannæformis.—*F. A. Romer.*
Megaphytum Hollebenii.—*Cotta.*
Knorria (several species).
Noeggerathia Rueckeriana.—*Göpp.*

These geologists have adopted this remarkable distinction of Floras as the principle of their subdivision of Thuringian and Saxon rocks into Devonian and Carboniferous, and the result of the adoption of this principle has already been a great extension of the territories of the lower Carboniferous period.

2. In the Rhenish provinces of Prussia, where the Devonian rocks are typically developed, this remarkable Devonian Flora has not been, so far as I am aware, as yet observed; but the lower Carboniferous Flora is extensively developed, containing the same plants as in Thuringia, and never descending into the typical Devonian beds.

3. In the Bas Boulonnais, in France, there is a remarkable group of lower Carboniferous beds, which have been described by Mr. Austen and Mr. Sharp. These beds have been considered by successive observers as Silurian, Devonian, and Carboniferous, but there is no doubt at present as to their true position; they are Carboniferous, descending in their lowest members into the disputed territory between Carboniferous and Devonian. I believe them to be altogether Carboniferous, in proof of which it is almost sufficient to mention that the very lowest beds in the district contain the well-known Carboniferous fossils:—

Terebratula ambigua;
Terebratula pleurodon;
Spirifer disjunctus;
Cyrtia laminosa;
Orthis resupinata;

and do *not* contain the characteristic Eifelian fossils of either the upper or lower groups.

Immediately above the limestone and dark shale, containing these

fossils, occurs a micaceous sandstone, with impressions of Ferns and Calamites, in such abundance as to have caused many fruitless searches for coal. Above the plant beds is found the Cucullæa bed of sandstone, containing the same fossils as the Marwood beds of Devonshire, above which again are found the usual characteristic lower Carboniferous fossils. The position of the fossil Flora of Bas Boulonnais is clearly established in the lower Carboniferous beds; the only arguments against this view being the occurrence of the Cucullæa beds above the plants, these beds having been considered as Devonian. But it must be remembered that the Marwood beds in Devonshire are themselves obscure, and should rather be interpreted by the Boulonnais beds than *vice versâ*. In the Boulonnais the Cucullæa sandstone lies between beds containing Carboniferous fossils, and no characteristic Eifelian fossils, and must, therefore, be considered as itself Carboniferous, and with it the Marwood beds of Devonshire. This view of the subject has been advocated by Mr. Sharp, whose only difficulty in considering the whole group as Carboniferous appears to be the occurrence of a few corals of Devonian type; but these very corals I have shown to occur abundantly in the Carboniferous beds of the Menai Straits, which have not been classed as Devonian by any geologist.

4. In a paper read by me before this Society, in November, 1853, I described a succession of 1730 feet of Carboniferous rocks at the Menai Straits, and came to the conclusion that there was no sufficient reason for considering the lower part of the series as Devonian, although there did occur in it some corals of Devonian type. These corals are specifically identical with the corals of the Boulonnais; but, like these, they occur with such an overwhelming number of Carboniferous fossils, that the whole series must be considered as Carboniferous. Of the 1730 feet of rocks, the lowest 80 contain remains of fossil plants in such abundance as to have led, as in France, to a considerable expenditure in search of coal. Among these plants the most common is a very long crushed stem, with narrow flutings, which would have been pronounced a Calamite but for the absence of joints; it should probably be referred to the genus Sigillaria, which is developed in Ireland, in beds of the same age, in a remarkable manner.

5. In Devonshire, near Marwood, a group of fossil plants has been found in Sloly Quarry, occurring in beds of the same age as the

Cucullæa sandstone of Marwood, at the base of the Carboniferous and top of what is commonly called the Devonian system,—a name which, it may be observed, is singularly ill chosen, as there is no district in Europe whose geology requires more interpretation than Devonshire and Cornwall.

These fossil plants have been examined by Professor Lindley and Professor Henslow, the former of whom considers that many of them may be referred to the genera Stigmaria and Lepidodendron; one is referred to the genus Sternbergia; and another is probably identical with *Calamites Volzii*, of Brongniart, from the obliquity of its articulations. One of the fossils is described by Mr. Lindley as having on one side the impression of a *Lepidodendron*, and on the other side it is striated like *Calamites arenaceus*. This remarkable appearance is referred by Mr. Lindley to accidental juxtaposition of two fossils; but in some of the Irish plants, of the same age, the same appearance is repeated under circumstances which render it impossible to refer it to accident.

According to the final judgment of Mr. Lindley, all the genera are referable to genera of the Coal period, but he hesitates to identify the species. Professor Henslow agrees in opinion as to the difficulty of identifying the species. Whatever opinion may be formed as to the age of the beds of S. Devon, it will readily be admitted that the Barnstaple and S. Petherwin beds, immediately below which the Cucullæa sandstone of Marwood and these fossil plants occur, are still open to question, as to whether they should be referred to the lower Carboniferous or the Eifelian type; and, in my judgment, the balance of evidence lies in favour of the former opinion; it is certainly very remarkable to find such a uniform development of fossil plants, at precisely the same period, through the whole of western Europe.

6. Considerable interest has been recently excited by the discovery of a land reptile, the *Telerpeton Elginense*, at Elgin, in Scotland, and also the occurrence of land plants in beds of the same age at Lerwick, in the Shetland Isles. Some of those plants, according to Dr. Fleming, bear a remote analogy to compressed stems of Sternbergia, and others, according to Dr. Joseph Hooker, may be referred to two distinct species of Calamites. The absence of articulations is noticed by him as a remarkable feature, and in two specimens he observed transverse raised knobs or bars, perhaps spirally arranged,

crossing the striæ obliquely. These fossil plants occur in the gray sandstone, or uppermost beds of the red sandstone of Scotland, in precisely the same geological position as the other plant beds already described.

Irish Plant Localities of the Yellow Sandstone Group.—Having thus described rapidly the occurrence of a remarkable group of fossil plants in a similar position at the base of the Carboniferous formation in other countries, I shall now proceed to mention the manner in which the same group of plants occurs in Ireland. We owe to Dr. Griffith the observation that fossil plants mark everywhere through Ireland the base of the Carboniferous system. This fact was known to him many years ago as a practical rule in working the boundary beds between the Carboniferous rocks and the rocks lying under; but, so far as I am aware, no attempt has been made to describe the fossil plants of the lower Carboniferous beds of Ireland, and accordingly, I gladly availed myself of Mr. Griffith's permission to examine his cabinet, and describe, as far as his specimens and some others in the Museum of Trinity College would allow of accurate description, the obscure but interesting remains of this primeval Flora.

1. One of the best collections of fossil plants, from a single locality, of this age, hitherto found in Ireland, is, I believe, the collection made by the Geological Survey, under the direction of our President, in the neighbourhood of Knocktopher, county of Kilkenny. It includes new species of Cyclopteris, and some varieties of Stigmaria, Calamites, and Lepidodendron.

With these plants occur some remarkable fresh-water shells of the genus Anodon, and some fish and crustacean remains, a description of which, and of the entire group, may shortly be expected from the palæontologists of the Survey.

I am informed by our President that sandstone beds, which contain species of Cucullæa identical with those of the Marwood beds of North Devon, occur above the plant-bearing beds of Knocktopher, which, it will be remembered, is analogous to the relation of the Cucullæa and plant beds in the Boulonnais and Devonshire. These plant beds occur just outside the boundary of Mr. Griffith's yellow sandstone, and it must be considered, from the analogies I have mentioned, as an open question whether they shall be considered as lower Carboniferous or upper Devonian.

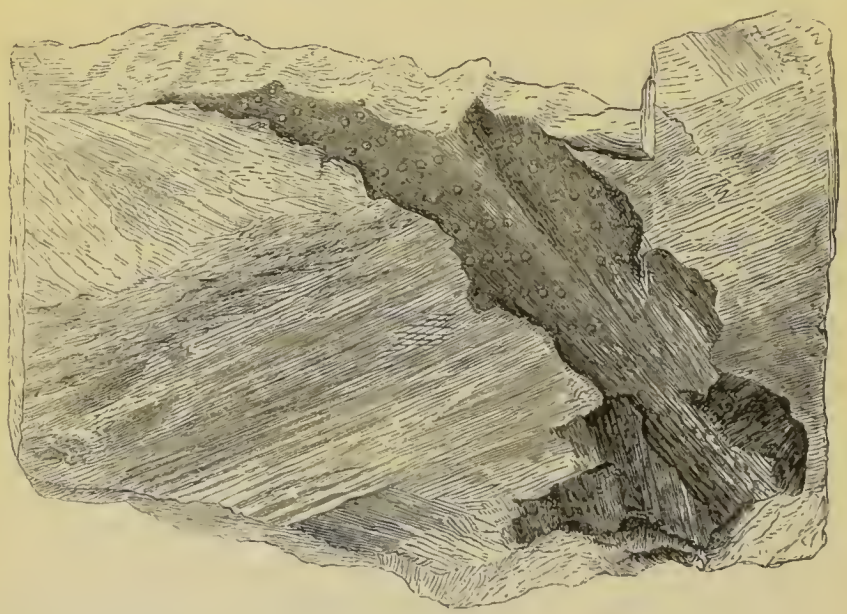
2. In the slaty and sandy beds underlying the synclinal axis of Carboniferous limestone at Tallow Bridge, county of Waterford, both to the north and south of the basin, a rich collection of fossil plants occurs, among which the following are the most remarkable:—

1. Lepidodendron Sternbergi.—*Ad Brong.*
2. Stigmaria (ficoides?)
3. Sigillaria dichotoma.
4. *Filicites dichotoma.*
5. *Lepidodendron minutum.*

The first of these plants, although the impression is obscure, I have little doubt is correctly named *L. Sternbergi*, and is specifically identical with the well-known plant of the coal-measures.

The Stigmaria is not identical with *S. ficoides*, from which it differs in the fact of the stigmata lying closer to each other than in *S. ficoides.* Measured in one direction, there are nine stigmata per inch, and in the other direction, nine stigmata in two inches.

I have named *Sigillaria dichotoma* a very remarkable and abundant fossil, which occurs in lengths sometimes of six feet, and which would be taken for a Calamite were it not for the want of



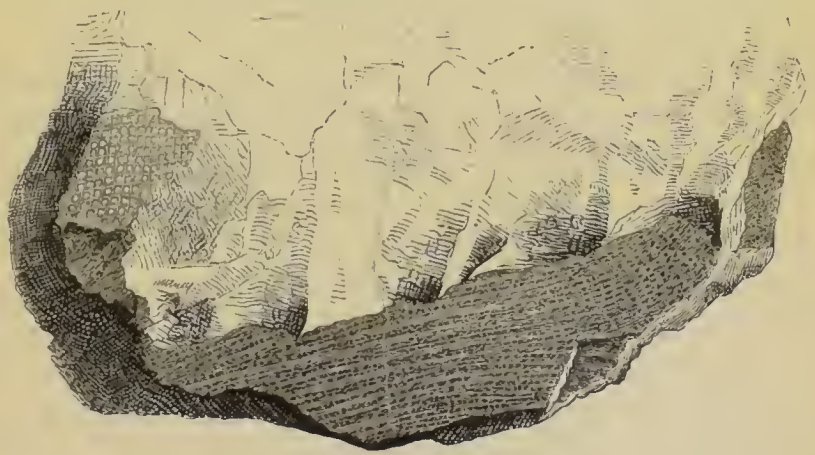
Sigillaria dichotoma, from Tallow Bridge, county of Waterford, showing the bifurcation of the stem and the circular spirally arranged, stigmata.

articulations. A perfect series of this plant has been formed by me from the specimens in Dr. Griffith's collection, in which the passage may be traced from the large, finely striated, dichotomous Sigillaria

stem to the small dichotomous branches known to me previously under the provisional name of *Filicites dichotoma*. The *Sigillaria dichotoma* is characterized by the fineness of its flutings, which I have not found exceeding six to the inch. This character renders it specifically distinct from any Sigillaria of the coal-measures. The stem dichotomizes regularly, each branch being half the undivided stem. When the stem is 3 in. diameter, the flutings are 13–14 to the inch; when the stem is $1\frac{1}{4}$ inch diameter, the flutings are 16–17 to the inch.

As the carbonaceous matter of the stem is wanting in the Tallow Bridge specimens, no markings of the leaf scars remain on the stem, except small circular punctures, which are arranged spirally in such a manner that the distances of the punctures or stigmata from each other in the spiral are *half* the distances between the spires: e. g., in a stem 1·2 in diameter, the vertical distance between the successive spiral rows is 0·27 in., while the distance of the stigmata from each other in the spire is 0·13 in., and the angle made with the horizon by the spire is 35°.

The *Filicites dichotoma*, which is a very common fossil plant, at the base of the Carboniferous series in many parts of Ireland, is only the upper and delicate branches of the *Sigillaria dichotoma*.



LEPIDODENDRON MINUTUM, and SIGILLARIA DICHOTOMA, from Tallow Bridge, county of Waterford, showing the former to be the cortical covering of the small branches of the latter.

The plant named by me provisionally *Lepidodendron minutum*, there is good reason to believe to be the true coating of the *Sigillaria dichotoma*.

This remarkable specimen recalls the observation of Professor Lindley on the Devonshire Lepidodendron.

3. A synclinal trough of Carboniferous limestone runs from Lismore to Dungarvan, from beneath which the slaty beds rise up, towards the north and south. At the south side, near Lismore, *Sigillaria dichotoma* and *Filicites dichotoma* have both been found; and on the north side, near Dungarvan, the *Sigillaria dichotoma* has been observed.

4. In a similar synclinal trough at Ardmore, county of Waterford, both *Sigillaria dichotoma* and *Filicites dichotoma* have been found in abundance in the beds underlying the Carboniferous limestone.

5. The synclinal trough of Carboniferous limestone on which the city of Cork is built stretches to the east and west of that city. At Midleton, on the east and north of this limestone, *Sigillaria dichotoma* has been found in the beds underlying the limestone, and on the banks of the river Lee, in a similar position, to the westward. Along this line, at Glanmire, the *Cyclopteris Hibernica* has been found.

6. A synclinal trough of Carboniferous limestone, similar to those already mentioned, passes from Cloyne to Carrigaline; in the neighbourhood of the latter place *Sigillaria dichotoma* has been found in the beds underlying the limestone.

The position of the beds just described, from 2 to 16 inclusive, is under the Carboniferous limestone, but still belonging to the Carboniferous period, as may be easily seen by referring to any list of fossils, from the slaty beds underlying the limestone; e.g. Mr. Welland's list of slate fossils from Midleton.

7. Near Bantry, fossil plants resembling those found at Knocktopher and Glanmire have been found in a similar position by the Government surveyors.

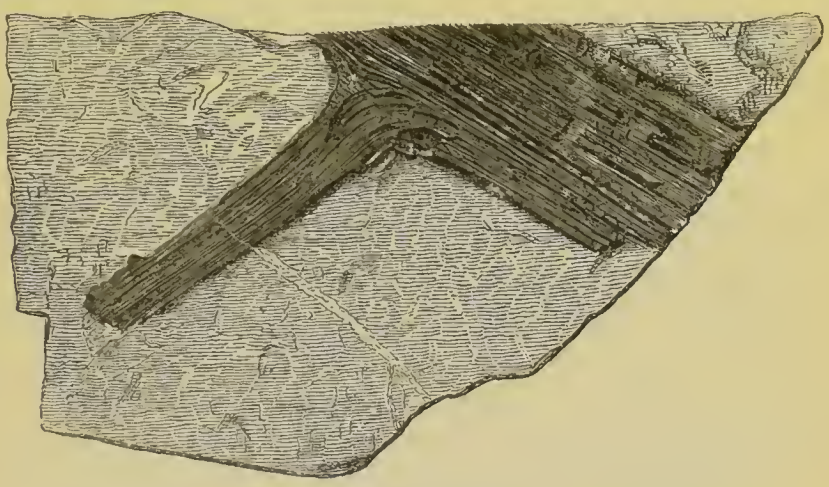
8. In Kenmare valley, near Roughty Bridge, *Sigillaria dichotoma*, associated with *Fenestella antiqua*, has been found, as stated by Dr. Griffith; and also in Brickeen Island, near Killarney, in the corresponding band of yellow sandstone, north of the Reeks.

9. At Cultra, county of Down, near Belfast Lough, a remarkable group of plants has been found in the beds classed by Dr. Griffith with the yellow sandstone series. The following occur abundantly :—

Stigmaria ficoides.
Lepidodendron (*new species.*)
Sternbergia approximata.
Calamites (*new species*), resembling a delicate variety of Cal. transitionis, *Göpp.*
Sigillaria (*new species*).
Filicites Cultranensis.

The first and third of these plants are well known in the coal-measures. The Calamite is a new species, and identical with a Calamite found in the calp beds of Clontarf, county of Dublin.

The *Filicites Cultranensis* I have named provisionally, until better specimens than those I have examined be found. It is identical with a plant found in the calp beds of the Naul, county of Dublin, which is here figured.



Filicites Cultranensis, from the Naul, county of Dublin.

The plants of Cultra occur in beds containing the marine shell *Kellia gregaria*, and the *Holoptychius Portlocki*, together with the characteristic *Modiola Macadami*, and species of *Ctenacanthus*, *Chelyophorus*, and *Cythere.*

10. At Dromard and Moyheland, near Draperstown, county of Londonderry, in the yellow sandstone band stretching from Newtownlimavady to Magherafelt, the *Sigillaria dichotoma* occurs with its characteristic spirally arranged punctures, which have been taken by some geologists for varieties of Spirorbis. With this plant is associated the *Filicites dichotoma*, which I believe to be identical with it, and the shells *Modiola Macadami* and *Atrypa gregaria*, with *Holoptychius Portlocki*. At Fallowgloon, near Maghera, in the same county, the *Sigillaria dichotoma* also occurs.

11. At St. John's Point, near Dunkineely, county of Donegal, a Calamite, n. sp., occurs, with characteristic Carboniferous mollusca and corals. Its articulations are oblique.

12. In the yellow sandstone beds which run north-east from Lower Lough Erne, near Pettigo, Calamites and other undermentioned plants have been found associated with *Modiola Macadami* in the same group of rocks; at Drumcurren, near Kesh, the highly characteristic coal plant *Sphenopteris linearis* occurs with *Holoptychius Portlocki.*

13. In the remarkable patch of yellow sandstone, on the borders of Leitrim and Longford, at Cloone, near Drumcorry, a *Lepidodendron*, n. sp., and *Lepidophyllum lanceolatum*, have been found associated with *Stigmaria ficoides.* These plants also occur at Monaduff, associated with *Modiola Macadami*, the *Oracanthus Milleri*, *Ctenacanthus*, and other fish remains, for which that locality is celebrated.

14. The last Irish locality to be mentioned is the typical yellow sandstone district of North Mayo.

Near Ballycastle, *Lepidodendron Sternbergi* occurs associated with species of *Ctenacanthus*, *Psammodus*, *Cladodus*, with *Atrypa gregaria*, *Modiola Macadami*, and about one hundred other Carboniferous fossils.

In the same district, on the shore of Lackan Bay, at Kilcummin, *Sphenopteris linearis*, identical with the Kesh specimens, occurs abundantly, and at Larganmore, near Bangor, numerous fossil plants occur in connexion with *Modiola Macadami* and a plant not known to me, but which bears a resemblance to some varieties of Knorria described by German geologists.

The fourteen distinct Irish yellow sandstone localities which I have enumerated, containing a group of fossil plants, of which many are identical with plants of undoubted Carboniferous age, when compared with the other six localities described, afford the strongest presumption that the beds in which these plants occur should be classed with the Carboniferous deposits, and that in Ireland the base line of the lower Carboniferous period should be placed below the entire group of plant beds.

As the fossil plants have been given in the order of localities, it will be of use to append to this method of viewing them a Table showing the localities in which each plant is found, arranged in the order of the plants themselves.

Name of Plant.	Locality.	Geological Period.
1. **Stigmaria ficoides,**	Cultra, Down. Cloone, Leitrim.	Yellow Sandstone. " "
2. **Stigmaria,** (new species),	Sloly Quarry, near Marwood, N. Devon. Tallow Bridge, Waterford.	Yellow Sandstone. Carboniferous Slate.
3. **Lepidodendron Sternbergi,** *Ad. Brong.* Sagenaria dichotoma, Geinitz.	Tallow Bridge, Waterford. Passim.	Carboniferous Slate. Coal-measures.
4. **Lepidodendron** (undescribed species),	Cultra, Down. Cloone, Leitrim. Ballycastle, Mayo.	Yellow Sandstone. " " " "
5. **Lepidophyllum lanceolatum,**	Cloone, Leitrim.	Yellow Sandstone.
6. **Sigillaria** (undescribed species),	Menai Straits. Cultra, Down.	Yellow Sandstone. " "
7. **Sigillaria dichotoma,**	Tallow Bridge, Waterford. Lismore, " Dungarvan, " Ardmore, " Midleton, Cork. River Lee, " Carrigaline, " Kenmare Valley, Kerry. Brickeen Island, Killarney.	Carboniferous Slate. " " " " " " " " " " " " Yellow Sandstone. " "
8. **Filicites dichotoma,**	Tallow Bridge, Waterford. Lismore, " Dungarvan, " Ardmore, "	Carboniferous Slate. " " " " " "
9. **Filicites Cultranensis,**	Cultra, Down. The Naul, Dublin.	Yellow Sandstone. Middle Carb. Limestone.
10. **Calamites Volzii ?** *Sternberg.*	Sloly Quarry, Marwood.,	Yellow Sandstone.
11. **Calamites arenaceus ?**	Sloly Quarry, Marwood.	Yellow Sandstone.
12. **Calamites transitionis,*** *Göpp.*		
13. **Calamites cannæformis,** *F. A. Rœmer.*	Liebschwitz, Saxony. Taubenpresseln, " Leoboschütz, Silesia. Tost, " Landeshut, " Altwasser, " Bogendorf, " Clausthal, Harz. Wernigerode. Magdeburg. Eimelrod, Upper Hesse. Herborn, Nassau. Falkenberg, Glatz. Ebersdorf and Berthelsdorf, in Saxony. Bristol and Newcastle.	Jüngste grauwackenschichten. " " " " " " " " " " " " Jüngere grauwacke. " " " " Posidonia schichten. " " Carboniferous Limestone. Aeltere Kohlenformation. Coal-measures.
14. **Calamites Cultranensis,**	Cultra, Down. Clontarf, Dublin.	Yellow Sandstone. Middle Carb. Limestone.
15. **Calamites** (undescribed species),	Ferques, Bas Boulonnais. Lerwick, Shetland. Bruckless, St. John's Pnt. Pettigoe, Donegal.	Yellow Sandstone. " " " " " "

* I believe this plant to be the same as the *Calamites cannæformis* of Römer, and only a variety of the *C. cannæformis* of Lindley and Hutton.

Name of Plant.	Locality.	Geological Period.
16. **Noeggerathia Rueckeriana,** *Göpp.*	Liebschwitz, Saxony. Leobschutz, Silesia. Bogendorf, ,, Friedersdorf, ,,	Jungste grauwaeke. ,, ,, ,, ,, ,, ,,
17. **Sternbergia approximata,**	Cultra, Down. Passim.	Yellow Sandstone. Coal-measures.
18. **Sternbergia** (new species).	Sloly Quarry, Marwood. Lerwick, Shetland.	Yellow Sandstone. ,, ,,
19. **Megaphytum Hollebenii,** *Göpp.*	Saxony and Silesia.	Red and Green schists of the Jungere grauwaeke.
20. **Knorria** (various species),	Saxony and Silesia. North coast of Mayo.	Red and Green schists of the Jungere Grauwacke. Yellow Sandstone.
21. **Undescribed species of Ferns,**	Ferques, Bas Boulonnais.	Yellow Sandstone.
22. **Cyclopteris Hibernica,** *Forbes.*	Kiltorcan, Co. Kilkenny. Glanmire, Cork. Bantry, Cork.	Yellow Sandstone. ,, ,, ,, ,,
23. **Sphenopteris linearis,**	Kesh, Fermanagh. Lackan Bay, Ballycastle, Mayo.	Yellow Sandstone. ,, ,,